JPRS 78380

25 June 1981

USSR Report

ENERGY

No. 62

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ELECTRIC POWER

ACHIEVEMENTS OF GEORGIAN POWER ECONOMY DESCRIBED

Tbilisi ZARYA VOSTOKA in Russian 2 Apr 81 p 2

[Article by A. Chitanava, director of the Tbilisi branch of the "Gidroproyekt" All-Union Planning, Surveying and Scientific Research Institute: "The Foundation of the Economy"]

[Text] In his report to the 26th party congress, Comrade L. I. Brezhnev very clearly established that an absolute prerequisite for carrying out all economic tasks--both industrial and social--is the development of heavy industry. This relates particularly to its basic sectors--fuel and power industries, first of all.

The natural conditions in our republic have dictated the high degree to which its territory is saturated with potential hydroelectric resources. Meanwhile, in prerevolutionary Georgia, the rich power potentials were practically unused. Construction of hydraulic stations began here at the end of the last century. Small-scale, technically primitive stations were built. They were small and primitive, incidentally, owing to the fact that their overall output did not ever exceed 2,000 kW.

The situation began to change radically in the 1920's after the Soviets became established in Georgia. As early as 1921, in accordance with Lenin's State Commission for the Electrification of Russia, the decision was made to construct the Zemo-Avchala hydroelectric station, a large station by the day's standards. At that time the young republic had to resolve many complex problems. There was an acute lack of specialist personnel and no experience in the construction of installations on such a scale.

The construction of the Zemo-Avchala GES, successfully completed in 1927, was the first step in the creation of the Georgia school of power engineering. This school developed and enriched its experience through the design and construction of subsequent hydroelectric installations--the Rioni GES, the Adzharistskali GES and others. The increase in specialist personnel made it possible by the mid-1930's to draw up a detail design for the high-head Khram GES-1 regulating hydroelectric power station--a design which for Georgia was fundamentally new. This installation was called upon to compensate for the winter slump in the generation of electric power at the then-existing hydroelectric stations which did not have the capability of redistributing the river flows on a seasonal basis.

The design and construction of the Khram GES-1 in the following years together with its completion in 1947-1948 signified a qualitatively new stage in the development of Georgia's hydraulic engineering and served as the basis for the creation of such highly efficient and uniquely designed installations as the Shaorskaya, Tkibuli, Ladzhanurskaya and the second Khram GES. While successfully developing the design and construction of hydroelectric stations utilizing great pressure heads, the republic's hydroelectric power engineers continued work on the creation of low pressure installations. This made it possible for them to increase their skills in a broad range of hydraulic power engineering problems and allowed them to undertake the solution to new, more complex problems. Such a problem was the design and construction of the hydroelectric station cascade on the Georgian waterway most valued for its power characteristics--the Inguri river. In particular, the problem involved the design and construction of the first cascade--the Inguri GES with its four descending hydrostations. The 271-meter high arched concrete dam, the tunnel more than 15 km long and 9.5 meters in diameter which carries water from the reservoir to the power unit and which sustains an internal pressure of up to 16 atmospheres, the five underground power conduits 5 meters in diameter which tolerate internal pressures of up to 55 atmospheres, the underground powerhouse 150 meters long and 51 meters high in which 5 units of 260,000-kW capacity each are installed--all these features make it possible to speak of the Inguri GES as a unique hydraulic power complex. Its commissioning showed the high degree of class of the Georgian school of hydraulic engineers, scientists, designers, builders and operators and proved that the further development of Georgia's hydropotential is assured. The guarantee of this is the high degree of mastery on the part of the specialists and the valuable experience they have accumulated.

It is difficult to assess the significance of the power giant on the Inguri. Indeed, the power generated by this station will in the last year of the 11th Five-Year Plan cover almost a third of the republic's requirement for electric power, surpassing the total output of all 22 remaining stations.

Over the course of many years, we have operated unique high-head structures and power units. There are now eight thermal stations operating in the Georgian power system (the largest of which is the Tbilisi GRES) and 22 hydroelectric power stations which in 1980 generated more than 14 billion kWh of electric power.

As was noted at the 26th congress of the Georgian Communist Party, considerable work on building up the republic's power potential has been carried out during the 10th Five-Year Plan. Thanks to the commissioning of the Inguri GRES and three stations on the Vartsikhskaya GES cascade as well as to the expanding of the Tkvarcheli GRES, the total output of the republic's electric-power stations increased by a factor of 1.6 in comparison with the previous five-year plan. The extent of electric networks has today reached 81,345 km. The number of substations and transformer stations has reached 7,852. The Georgian power system is now connected to the power systems of the Transcaucasus republics and with the USSR Unified Power System.

Such a power potential in the republic has allowed workers in industry, agriculture and all other sectors of the economy to achieve high final results and to make advances in the intensification of the economy.

The "Basic Directions in the USSR's Economic and Social Development for the Years 1981-1985 and for the Period to 1990" adopted by the 26th congress established a clear program for the further development of hydraulic power engineering in Georgia. During the five-year plan just begun, the fourth stage of the Vartsikhskiy cascade on the Rioni river and the Zhinval'skaya GES on the Aragvi will be completed and commissioned. The utilization of its reservoir will radically improve the water supply to the city of Tbilisi and will reduce the shortage in the water balance of the Kura river near the city of Rustavi. During these years, work will begin on the major structures of the Khudonskaya GES on the Inguri--the next stage in the Inguri hydrostation cascade. The commissioning of the Khudonskaya GES is planned for 1989 and will mark the development of almost three quarters of all the actual available energy in the cascade for which two more stages are planned.

The plans for the current five-year period include the construction of the Namakhvanskaya GES on the Rioni river--a station which will become the nucleus of the Rioni cascade. The reservoir of the Namakhvanskaya GES will make it possible to increase noticeably the wintertime power output of the Gumati, Rioni and Vartsikhskaya GES's. This will make it possible to increse their role in the power system. The annual output of electric power at the Namakhvanskaya GES will amount to eight percent of the republic's needs by the end of the 12th Five-Year Plan.

The Akhaltsikhskiy integrated hydraulic power system (the Minadze GES) is now being planned for the upper reaches of the Kura river. It is felt that the construction of this installation so important for the republic must be started during this five-year plan. It exemplifies the multipurpose joint utilization of water resources. Under present conditions, when the need for fresh water increases constantly and its shortage is already being felt, the problem of a more efficient utilization of river flows arises. A regulating reservoir in the upper reaches of the Kura will make it possible to eliminate the shortfall in the water balance in the cities of Rustavi and Tbilisi by as early as the end of the decade. In addition, it will make it possible to avoid flood damage, particularly in the Borzhomi region.

Simultaneously with the work being done on designing and constructing the hydroelectric-power installations of the 11th Five-Year Plan, a longer-range plan is being developed. This is being done in order to provide for the further, more systematic development of the republic's power base. Of primary significance is the renovation of the systems which have been designed for the utilization of the upstream reaches of the Inguri, Rioni and Tskhenis-Tskali rivers based upon modern requirements for protection of the environment as well as changing demographic conditions.

Up to 40 percent of the republic's hydraulic power potential is concentrated in medium-and small-sized rivers. For this reason, when establishing a system for the utilization of these water flows, one must take into full consideration the social aspects of the development of a number of mountain regions in the republic. For example, during the construction of the Inguri GES, almost 300 km of roadway were laid, 250,000 m^2 of living area were constructed and the water supply to a great many population centers, including the city of Zugdidi, was improved. Much was also done here for training construction personnel from among the local inhabitants.

There is yet another thing to mention. When planning construction in sparsely populated and relatively backward mountain regions, it is important that one consider all possibilities for the development of tourism in the republic's scenic regions. In developing long-range plans, it is important to provide also for the solution to all problems relating to the protection of the environment. Much remains to be done in preserving the shoreline of the Black Sea. The hydroelectric-power installations built here have not brought a perceptible loss of productive lands. Measures have constantly been taken for the maximum limitation of the diversion of these lands. During the design and construction of hydroelectric stations on the Inguri and Rioni rivers, comprehensive measures were and still are being established for guaranteeing the stability of the shoreline along the Black Sea in the areas around the village of Anakliya and the city of Poti. The accomplishment of these measures protects the shores from erosion.

In examining the problems associated with the development of hydraulic power engineering, one cannot pass up the most important matter of the relationships among the different groups of electric power consumers in the power system. The fact of the matter is that the natural characteristics of Georgia's rivers make it impossible to utilize large-scale hydroelectric power stations for the generation of the electric power base. We can only develop such power at thermal stations. As was noted at the 26th congress of the Georgian Communist Party, the construction and commissioning of a base electric power station will be a qualitatively new stage in supplying the republic with its electric power base.

Improvements in the technical outfitting of construction organizations are acquiring primary importance in accelerating the construction of hydroelectric power stations, for improving the effectiveness of capital investment and for speeding up the introduction of new power capacities. The construction of hydrostations under the conditions found in Georgia involves a great volume of underground work. For example, more than 70 km of water tunnels and four large-scale underground power centers have been built in the post-war years alone. It is for this reason that it is now necessary to improve in all possible ways the tunneling equipment needed to achieve industrialization of the construction bases.

The unabated complication of problems associated with the construction of hydroelectric-power facilities in mountainous regions, where each new installation requires a creative approach, is presenting more demanding problems for design and scientific research organizations. The main thing here is to guarantee the economy and effectiveness of decisions made in an effort to insure the reliability of structures which will be operated under complex seismic conditions.

At the beginning of the development of hydroelectric power engineering its problems were essentially solved by one design and one scientific research section. Today, however, dozens of organizations participate in this activity. Their joint operation insures reliable solutions to complex problems. However, the proper coordination of this activity, which frequently demands considerable expense, is impossible without a clear-cut plan for financing. This program, in addition to everything else, must insure the timely formulation of detail designs for new construction projects.

The "Basic Directions in the USSR's Economic and Social Development for the Years 1981-1985 and for the Period to 1990" provides for an increase in the production of electric power in the Georgian SSR by a factor of 1.2. This is an urgent problem, and in order to solve it, we must consider the great amount of experience accumulated by power engineers in Soviet Georgia over the course of the last six decades. There is no doubt that the republic's power engineers, inspired by the historic resolutions of the party's 26th congress, will confidently make new advances in the growth of power engineering and will do everything to provide more fully for power engineering in the national economy.

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CSO: 1822/136

CONSTRUCTION PROBLEMS AT EKIBASTUZ THERMAL POWER COMPLEX DISCUSSED

Moscow LITERATURNAYA GAZETA in Russian No 10, 4 Mar 81 p 12

[Interview with B. Ivanov, Kazakh minister of power and electrification, by A. Samoylenko; date and place not specified]

[Text] [Question] Boris Petrovich, we are speaking with you at an important time. All of our country has been impressed by the party congress. The scale of the tasks set in the CPSU Central Committee Report, the real social problems on which the delegates who came to the Kremlin from all over the country concentrated their attention, the program of construction planned by the congress--each of us, no matter what we had been occupied with before, now takes on all of this. The data from the congress is still to be studied long and carefully, but it is already clear that great, strenuous work remains to be done--work that requires total commitment from all Soviet people. This, to the same degree, pertains to power engineers.

[Answer] We power engineers were frequently thought of at the congress, for the business with which we are professionally associated is today acquiring particular significance. To be sure, the Soviet Union does not face an energy crisis, in contrast to many Western countries. In this respect, our position is stable enough. We are able to supply ourselves with all forms of energy and we have at our disposal reliable reserves of energy resources. Nevertheless, this fact does not at all mean that we can rest on our laurels. It does not mean that we do not need to develop our power industry at a rapid pace nor that we do not need to conserve energy and so forth. As you know, the 26th party congress directed the Soviet people toward the complex problems of power engineering, taking into consideration the rapid growth of the country's economy.

[Question] Boris Petrovich, we, of course, could speak with you in general about power engineering in Kazakhstan. I do not doubt that thanks to your participation in the dialogue we would have an interesting conversation about the lives, affairs and problems of power engineers and power-industry construction workers in Kazakhstan. I hope, however, that you will agree to devote our discussion only to the ETEK--to the unique, incomparable and unprecedented ETEK which fully reflects all the capabilities of the domestic power industry and which secures priority for our country in world power-plant construction.

[Answer] I agree. Actually, the ETEK (Ekibastuz Thermal Power Complex) is today the pinnacle of scientific and technical thought in power engineering. With re-

spect to the grand scale of the structures, the level of technical solutions and its economic impact, the ETEK has no peer in world power-plant construction. I can tell you that the pride of the Americans is the famous Tennessee complex, consisting of 31 stations with a combined output of 13 million kW. We, however, are building five stations with a total output of 20 million kW!

[Question] That astronomical figure is beyond the scope of layman's understanding.

[Answer] Well, in that case one can make the following comparison: the power complex being built in Kazakhstan will generate as much electric power as is produced today by such a highly developed country as France. I think that this fact is sufficiently eloquent and easily understood. Here is a second characteristic of the ETEK for you: with respect to scale, the Ekibastuz Thermal Power Complex stands alongside the BAM and the KamAZ. Incidentally, in order to assuage your layman's perceptions, I have to tell you that many of the ETEK's characteristics astound even us professional power engineers. We cannot impassively acknowledge the fact, for example, that the five stations will burn more than 12,000 t of Ekibastuz coal per hour and that the height of each of the smokestacks is 400 m (compare: the Ostankino television tower is 536 m high). Very soon the Ekibastuz miners will extract 100 million tons of coal annually for the thermal stations of the ETEK!

[Question] Consequently, the ETEK's task is also immense?

[Answer] Without a doubt! In the near future, the ETEK will become the power-production heart of the country's large-scale industrial center. Since we decided to portray the ETEK, I will cite one more characteristic: the unique direct-current transmission line of 1,500-kV rating will transport 42 billion kWh of electric power annually. This is almost as much power as was generated in 1945 by all the electric power stations in the USSR.

This gigantic electric bridge 2,415 km long will stretch across the Kazakhstan steppes, the Urals and central Russia. Eventually it will be a most important stage in the development of our State's Unified Power System. Such is the ETEK!

[[Question] Boris Petrovich, you were speaking exclusively of the ETEK in the future, which, however, is understandable. Indeed, the realization of such a far-reaching energy program began relatively recently. Nevertheless, are some parts of this program already a reality?

[Answer] Yes, and this reality is very impressive. Three of the eight units in the first GRES are already providing power. The construction of the second Southern Kazakhstan GRES in the ETEK has already begun. Work is proceeding apace on the detail design of a third station. In a word, time is at work at the ETEK!

[Question] And it works, as I understand, thanks to the efforts of not only the power engineers? Even with the briefest of characterizations you gave for the ETEK, it is quite clear that its construction is not at all an industry task.

[Answer] An industry task? It is a State-wide task! Dozens of the most varied design and scientific centers, plants, factories, ministries and departments are taking part in the construction of the ETEK. The given power production program

is a serious test of our capability for multi-industry cooperation at a high State level. The ETEK gives accurate and strong testimony to how we are able and how we should work while solving far-reaching socioeconomic tasks.

[Question] In that case, Boris Petrovich, it would be interesting to find out your opinion in the matter. Great work lies ahead, and its success will depend in full measure upon the flexibility, as you expressed it, of multi-industry cooperation, upon the State (and not departmental) attitude toward its partner and upon the degree to which it is understood that a mutual venture does not mean a certain mutual, impersonal responsibility for this affair. How are the participants in the ETEK construction faring on this examination? It is probably true that not all of them have received the highest marks.

[Answer] Not all of them, unfortunately. Of course, it would be naive to suppose that the construction of such a lumbering hulk as the ETEK would be ideal, without problems, disruptions and errors. The usual problems arising during the work itself are one thing, while subjective problems, so to speak, are another matter. There is much we need to do differently--quicker, better, with a greater degree of responsibility, just as was demanded from all of us by the 26th party congress. One wishes that the USSR Ministry of the Electrical Equipment Industry and the rail transport management, in particular, understood this.

[Question] What do you mean? There are in fact numerous coordinating conferences, boards and meetings being conducted on the ETEK. Their purpose is the consolidation of effort, mutual sharing of information and guidance. After all this, who then could not understand his role and the measure of his responsibility in the construction of the ETEK?

[Answer] Meetings are fine, if only for the reason that, as far as I know, everything is always clear to everyone. In life, however, during the actual construction, something is different. For example, everyone understands that the power of the ETEK must be supplied to the consumers. Consequently, we will have to construct a powerful electric transmission line.

[Question] Is this not a responsibility of the Ministry of Energy?

[Answer] Yes, it is. When this line must be built, we will run it where we choose. The whole difficulty lies in the fact that the extreme high-voltage equipment for this line is in the experimental testing stage and the results of these tests leave much to be desired. Only yesterday we did not feel the need for such equipment and we quietly got along with what we had. Today, however, when the ETEK is coming into being, an acute need has arisen for equipment that is super-powerful and fundamentally new. We do not have it, and it looks as if we will not get it soon. I think that the USSR Ministry of the Electrical Equipment Industry has a reason to move along quickly with the manufacture of this equipment for ETEK's power bridges.

[Question] I will not undertake to justify the Ministry of the Electrical Equipment Industry, but we still have time, do we not?

[Answer] No, little time remains. The day is not far off when the ETEK will begin to carry out its primary function--the supply of large amounts of power to Siberia.

the Urals and central Russia. Heaven forbid that a situation should come about in which we, possessing a tremendous volume of energy, would be unable to deliver it beyond the borders of the republic! We believe, however, that our associates taking part in this program have many intelligent, talented and energetic specialists who, I assume, will be aware of the degree of seriousness of this urgent situation. At the proper time, nevertheless, they will make available to the ETEK the equipment necessary to transport the great amount of power. Let us believe that the ETEK will play its enormous role in the development of our country's energy potential.

[Question] Well then, let us believe. What did you mean, Boris Petrovich, when you mentioned the railroad?

[Answer] Here I wish to speak more harshly, for there is evidence of departmental egoism and even neglect of the ETEK's urgent problems. To wit: at one time it was decided that the builders of the Ekibastuz thermal stations would be taken to work by rail. Do not be surprised, but there are 12,000 people working in shifts on the construction of the ETEK today who need to be taken from home to work and then back again safely. We laid tracks to the first station, erected the necessary facilities for servicing passenger cars and were just about to turn over these facilities to the rail workers for operation. It was not to be, however. The railroad workers suddenly adopted an attitude, telling us that they would only begin taking the ETEK builders to work when we connected all the stations by rail and when we had built the entire ETEK rail system.

[Question] Excuse me, Boris Petrovich, but that seems strange! What will happen if we will not transport until you have everything built? How can you build everything if the workers do not get transported? Is it really possible that such, putting it lightly, strange things can take place at a supermodern construction project of such Statewide importance?

[Answer] What is more, I have to tell you that to this day we have not managed to break this resistance. That being the case, a very urgent question arises: how to deliver the army of many thousands of builders from Ekibastuz to the stations under construction? You see, this is what happens: the capriciousness of one department turned into a vital problem for everyone--how to get to work. We had to purchase 150 buses in order to arrange the efficient transportation of the Ekibastuz power-plant construction workers. This is an entire fleet towards whose maintenance go unplanned State funds and a great amount of POL supplies. How is it possible to speak of fuel economy and a regard for the public ruble when such things are allowed to go on?

By the way, we do not have complaints about the railroads alone. As far back as four years ago the USSR Ministry of Heavy Machinery Manufacture was supposed to begin development and the construction of a machine for working with coal at the station's coal-storage facilities, where the volume of coal is enormous. Almost the entire five-year period has gone by and still we do not have the machine desired. Again we are forced to provide ourselves with an entire detachment of bulldozers in order to "battle" with millions of tons of coal. The equipment is not suited for this work, so it is a torment for the people--dust, oppressive heat and frequent breakdowns. The power engineers, however, are stubborn people and I

believe that we will press on to the end. It cannot be otherwise. The party congress has emphasized anew with all resolve: all must conform to party discipline.

[Question] Boris Petrovich, these are, to be sure, unpleasant facts, but I know that they do not determine the nature of the mutual business relations among the participants in the Ekibastuz power program.

[Answer] I would probably even say that the previous subject of our conversation is an unpleasant exception to the rule. Practically everything else testifies to the fact that we are able to resolve great socioeconomic programs in harmonious and flexible cooperation among the industries. I cannot but speak of the USSR Ministry of Machine Building as an excellent business partner. This department carries out a crucial part of the Ekibastuz program--the development and installation of boilers and turbines for our stations. I wish to note that this equipment was developed especially for the high-ash Ekibastuz coal. At no point in this great and complex undertaking did Minenergomash allow any irregularity or interruption in the delivery schedule.

[Question] Boris Petrovich, you named many characteristics that testify to the scale and unique nature of the ETEK. While acquainting myself with certain documents pertaining to the Ekibastuz station cascade, I wrote down in my notebook similar facts which had a slightly different coloring. For example, Ekibastuz coal is distinguished by its very high ash content: in one year the five stations in the power complex will produce along with the electric power 52 million m^3 of slag and ash; the 10 gigantic stacks will constantly release smoke into the atmosphere. I have to confess that these figures cause alarm and urge me to ask you: how does this square with questions of the ecology? Is it possible to preserve the environment with "anti-nature activity" of such scope?

[Answer] I am more optimistically inclined on that score.

[Question] I would be glad if you would share your optimism.

[Answer] I hope that you will share it after I present convincing proof of how much money and effort has been invested in reducing the harmful effects of the ETEK on the environment to the barest minimum. I will tell you right off that there was no discussion on this issue. The ecologists and those who customarily protect nature understood perfectly well that without an environmental protection program the ETEK would wreak great harm. It was enough to picture how the millions of tons of dust-like ash would behave when exposed to the Ekibastuz winds, known for their force. Even during the design stages of the station complex the interests of the power engineers were made totally dependent upon questions of the ecology. Dozens of scientific institutes worked on solving the "ETEK-nature" problem and all "harmful" parameters were coordinated with the ecologists. For example, their "permission" for the construction of the ETEK was obtained by us only when we presented conclusive proof of how we will be able to retain 99.8 percent of the ash during burning of the coal. As you can see, the battle is being waged over a few hundredths of a percent of this indicator.

[Question] Let us assume that you retain the ash but must, all the same, have to haul it somewhere and hide it so that the winds do not get it. Indeed, there are cities, settlements and virgin lands surrounding the station.

[Answer] This problem has also been solved. Not far from the power complex we located a gigantic depression where at one time there had been the Karasor salt lake. This site is being utilized as a storage area for the ash. The volume of the Karasor salt lake is such that it is capable of taking the waste from the five stations for the next 60 years. It, however, is not just a dump. We will collect the ash and save it until someone who can use it shows up.

Nor is it by accident that we erected such tall smokestacks. These are genuine, ecologically protective structures which will reduce the gas pollution of the environment to a level of parts per thousand of harmful substances in the air. The dispersion of these parts per thousand will take place at a height of 400 meters. In addition, we have made provisions for a combined system for recovering industrial wastes. So, you can freely share my optimism.

[Question] Yes, what you say sounds convincing enough. But we will have to wait and see. Boris Petrovich, I see two large blue spots on your map in the Ekibastuz region. As far as I remember, there were no lakes in these areas.

[Answer] That is correct, there were none. Now they are there, beautiful lakes with good, fresh water. Ancient reservoirs--totally dead, with bitter salt water--were biding their time. I remember this ecological action of the power engineers with particular satisfaction. Imagine what was done: we washed out the beds of these former lakes with water from the Irtysh-Karaganda canal and then filled them to the, so to speak, naturally designed levels. From here we take water for the station and return it after carefully purifying it. Now there are good fish and crayfish in these lakes! Workers in the fishing industry who have studied the potentialities of our power-station lakes in detail are full of enthusiasm to continue their work on fish breeding.

[Question] Boris Petrovich, 10 years ago you worked as director of "Pavlodarenergo". You will remember what life was like then in the Pavlodar region by the Irtysh--quiet and unhurried. It was difficult to find something remarkable in the Ekibastuz life. Today we know, however, that it will be a modern city of power engineers and miners with a population of 200,000. Very serious problems have arisen with housing and cultural construction.

[Answer] Not simply serous! We consider these problems to be first and foremost. In recent years we have turned over 60,000 m^2 of living space. Why, this is 1,500 decent-sized three-room apartments annually! For Ekibastuz, the growth rate is unbelievable, but we see that it still is not enough. We wish that each participant in the construction of the ETEK would receive an apartment as early as three to four months and would not have to wait a year for it. This is the kind of task we have set for ourselves.

Much has been done. Much work still lies ahead. We undoubtedly will give our country a unique, superpowerful ETEK.

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CSO: 1822/136

DEVELOPMENT OF HIGH-CAPACITY TRANSMISSION LINES PLANNED

Moscow KRASNAYA ZVEZDA in Russian 12 Feb 81 p 2

[Interview with P. P. Palaleyev, first deputy minister of USSR power and electrification by Engr-Maj O. Bobrakov; date and place not specified]

[Text] [Question] In its plan for the 26th party congress, the CPSU Central Committee has paid great attention to questions regarding the further improvement of the country's fuel and power complex, including electric-power production. Would you be so kind as to briefly characterize the major trends in the development of this sector?

[Answer] About 1.3 trillion kilowatthours of electric power are now being produced yearly in our country. This figure is impressive. In a little over two days we now generate as much electric power as was specified in the yearly production plan of the State Commission for the Electrification of Russia. We still need even more. In 1985, the production of electric power will grow to 1.55 to 1.6 trillion kilowatthours. New atomic, thermal and hydroelectric power stations will be built and the output of presently operating stations will be increased. Electric-power stations utilizing the coal of the Ekibastuz and Kansko-Achinsk basins as well as natural and casing-head gas from deposits in eastern Siberia will be constructed at an accelerated pace.

[Question] One can well understand that this electric power must be delivered to the consumer with the least losses and that a reliable electic-power supply be provided to industry and the population independent of the time of day and possible breakdowns in the system, etc. What do you foresee being done in this direction in the 11th Five-Year Plan?

[Answer] Actually, the conveying of power is one of the key problems in the development of the fuel and power complex. A proper solution to this problem is singularly important for our country with its great land area and its particular distribution of industrial forces and sources of raw materials. In fact, about 80 percent of the USSR's reserves of fuel and power resources are located in the Asian portion of the country. Consequently, the major flows of energy must be directed from east to west, toward the country's major economic centers.

In what form, however, is the energy transported? It is theoretically possible to construct electric power stations close to the consumers and deliver fuel to

them--coal, oil, etc.--from remote areas. Will this be economical? It is well known that an intensive transition is now under way from thermal electric power stations operating on fuel oil and other oil and gas products to stations utilizing cheap coals. The transportation of the latter by rail is proving to be an expensive solution. It is much more efficient to construct powerful electric stations near the coal mines and provide power to consumers at considerable distances over high-tension lines. Calculations show, for example, that a single modern high-tension transmission line for alternating current of 1,150-kV capacity or 1,500-kV capacity for direct current can provide for the transmission of about 25 to 40 billion kilowatthours of electric power annually from the east to the Urals or the European portion of the USSR. This is equivalent to the transport of 25 to 40 million tons of Ekibastuz coal by rail. This would require almost a million cars or 50 trains daily.

Essentially, there are two major factors which make it necessary to increase the construction of high-and very high-tension transmission lines. On one hand, there is the further centralization of electric-power production. On the other, there is the continued work on completing the USSR's Unified Power System. The centralization of the production of electric power is indicated by the planned program for the construction of powerful atomic electric power stations of 4 to 6 million kilowatt capacities as well as by plans for the construction of fuel and power giants such as the Kansko-Achinsk complex, where 10 electric-power stations of 6.4 million kW capacity each will be built in the future. These will be equal in output to the largest Sayano-Shushenskaya hydroelectric station. The Ekibastuz complex will have 5 stations of 4 million kW capacity each, and the Surgut complex will have a total capacity of 15 to 17 million kW.

In order to combine the outputs of similar giants and to transmit this power to the power system, to provide a reliable power supply to the consumers in various regions of the country and to make the system stable despite peak loads and any possible malfunction in the power networks, etc., it will be necessary to further improve the Unified Power System as stipulated in the CPSU Central Committee's draft for the 26th party congress. The Unified Power System already encompasses an enormous territory, extending 3,000 km from north to south and 6,000 km from east to west.

[Question] What should the new electric transmission lines be like? Up until recently we have developed systems with high voltages of 330 and 500 kV. A number of 750-kV lines were built during the 10th Five-Year Plan. In the draft for the 26th party congress, the CPSU Central Committee is faced with the task of commissioning the first phase of a 1,500-kV direct-current transmission line and a 1,150-kV alternating-current line. With what is this associated?

[Answer] It is associated, first of all, with the growth of power-output overloads between power systems. With the present-day increase in the unit capacities of power stations and complexes, the power densities in the lines have increased by two to two and a half times. As we have already said, the distances over which the electric power must be conveyed have also increased considerably. Studies which have been carried out on the basis of data from these cases show that it would be expedient to construct 750-kV transmission lines to replace previously constructed 330-kV lines. This reduces the volume of construction work by 30 percent and the

annual cost of the transmission of power by 10 to 20 percent. Moreover, the line's capacity increases approximately six-fold.

The construction of 1,150-kV alternating-current lines will be extensively developed in the 11th Five-Year Plan. This will permit the transmission of up to 4,000 to 5,000 MW of power at a 10 to 15 percent reduction in the cost of transmission. Construction in our country has begun on a 1,150-kV transmission line more than a thousand kilometers long between Ekibastuz and Chelyabinsk. Construction has also begun on an experimental industrial line of the same voltage between Itat and Novokuznetsk. The following parameters will provide some idea of the line's design: the distance between phases, each of which is carried by eight conductors, is 24 m, while the distance to the ground is not less than 17 m. The weight of one intermediate support is 20 t, its height up to 50 m. The construction of similar lines, primarily in the country's eastern regions, will be continued during the five-year plan.

Power engineers are also studying a long-range prospect--the construction of alternating-current power-transmission lines of up to 1,800-kV capacity. At the same time, power engineers are developing methods of utilizing very-high voltage direct-current lines for transmitting high-output electric power over distances greater than 1,500 km. We have begun construction on the first 1,500-kV direct-current transmission line from Ekibastuz to the country's center--a distance of 2,500 km. Construction on this line has just begun, and already the experts are designing new direct-current lines. These lines will become tomorrow's power arteries.

9512
CSO: 1822/136

REVIEW OF CONSTRUCTION AT ROVENSKAYA AES

Kiev RABOCHAYA GAZETA in Russian 21 Apr 81 p 2

[Article by Ye.A. Shalash, tower crane machinist in the Kuznetsovskiy installation section of the "Yuzhenergomontazh" trust and delegate to the 26th CPSU Congress: "On the Agenda. In Order Not to Fall Behind Tomorrow"]

[Text] Sucess does not come in and of itself. It is to be assured through a clear-cut well thought out organization of the work of all production links, as well as increased responsibility of each person for the assigned job. And also, adds the author of the article, Yekaterina Adamovna Shalash, the know-how to find one's own place in carrying out the assigned task.

This event will always remain in my memory. The first reactor of the Rovenskaya nuclear electric power station was started at 5:36 PM on December 22nd of last year, when the nation marked the 60th Anniversary of the Leninist State Commission for the Electrification of Russia plan. Comrade L.I. Brezhnev warmly congratulated all of the participants in the construction of Rovenskaya AES on the remarkable labor victory. I cannot describe the joy with which these sincere words of congratulation and the warm wishes for personal happiness and new labor successes were met. And for me, this joy was multiplied by the great honor of representing the Rovenskaya communists at the 26th CPSU Congress. Both in Moscow and upon returning home, I thought a great deal and analyzed the stage our all-union key construction projects had passed through, and attempted to see how it would look in the future.

As is well known, the task of attaining a major growth in electrical power in the Ukrainian SSR by means of nuclear electric power stations is set in the major directions for the nation's development. This means, we, the builders and operational workers of the Rovenskaya nuclear plant should also make our own contribution to carrying out this task.

Of course, our successes make us glad. But they are no grounds for complacency. For in the years past, we had no few number of errors and misunderstandings which seriously held up the work. At the start of construction, many organizational and engineering errors were committed; they had to be corrected with

considerable difficulty. There was talk at the party management active membership meeting in January of this year about some of our organizations and sections which do not carry out the assignments concerning the growth in labor productivity, and the unsatisfactory work organization has been compensated here by having more personnel on staff than called for in the plan. The facts of the overconsumption of construction materials, thermal and electrical power as well as losses of worker time were cited. There was talk of the low level of labor discipline.

Unfortunately, all of this is true. As a machinist on a power crane with the work position 12 meters high, I can see a great deal around: where and how someone is working, what he leaves after himself . . . the complete brigade of installation workers, headed up by Vasiliy Maksimovich Mendelev, whose crane I service, has good indicators. But at what a price they were achieved! It is sufficient to recall that before starting the construction of the main building, no one worried about the approach roads to it. The heavy load tractors for hauling the metal units and structures could hardly get to the delivery point, and how many times was it necessary to tow them out themselves!

Everbody knows well that prior to starting work, it is essential to prepare the work site and then to observe basic order there. Our construction sites were so trashy that the devil himself would break a leg. We did not learn how to store equipment, effectively manage or make timely use of materials or work smoothly. Did it not really happen that they started to lay the foundation after the installation of the equipment and the electricians worked along behind the finish workers? And how many times was slipshod work done and then later all efforts were thrown in to eliminate the rejects and badly done work! I speak about this so as not to repeat yesterday's mistakes tomorrow.

Much has been done in a smoother and more clear cut manner in the second unit, where we are working now. The construction of the approach roads has started, although not on time, but at least along with the construction of the above ground portion of the building. The preliminary installation sites have been planned and made for all of the subcontracting organizations and the lighting has been put in on time; considerable attention is being devoted to cleanliness at the facilities and the schedules stages in the turnover of individual components of the construction project is being observed more strictly, something which is helped by the competition based on the principle "workers' relay race." As our specialists figure, this can boost labor productivity by 10 to 15 percent.

It can . . . but as yet, we have unfortunately seen nothing of the kind. And not because someone is dawdling, on the contrary, the builders are striving to do as much as possible. And how do you do this, if for example, the shift where I work was forced to stand idle three times in just the first half of January? Once the chief of the construction superintendent section, Vladimir Matveyevich Pankratov asked me to "extend" my own shift a little and help the brigades of installation workers on the structures with the installation of one of the components of the turbine gererator of the second block on time. I agreed. And then I stood idle along with the brigade: the temporary electrical power supply service did not operate.

Similar lacks of coordination still occur. We stand idle because of a lack of oxygen. They say there are no funds and the set amount has been expended: and that's enough! And without oxygen, what do you cut metal with? In order not to disrupt the plan, it is necessary to take evasive action. The section supplier drive vehicles to Rovno and get oxygen. And this is at the time when the construction project site has its own oxygen station. I think that in order to eliminate "oxygen famine", it is expedient to change the metal cutting technology and set up more economical preparation sites for this. In any case, it is not reasonable to get out of the situation with this piecemeal homemade approach, and it is even disadvantageous.

We have yet another bottleneck: transporting people. The residents of Kuznetsovsk and several tens of surrounding villages work at the construction project. To get them to work on time and thereafter take them back to their various homes is a rather complex problem, and an optimal solution for it has been sought for a number of years now at practically every meeting in the headquarters of the construction project.

With well organized travel via ring routes, 33 of the allocated buses would be sufficient to transport the people. But it turns out in practice that five to six vehicles usually do not go on their routes. This is what reduces labor productivity and undermines discipline. Of course, we are not reconciled to this. Our activists make raids and the administration makes the appropriate decisions. Everything stops at that. Because passenger transportation is not subordinate to us. And in the Rovenskaya Oblast motor vehicle transportation association they feel that our affairs can wait.

There's yet another important aspect of the matter. In the five-year plan just passed, we underfulfilled the plan for cultural and personal construction by more than one million rubles. In the past year, let us say, it was planned that a teaching building and a dormitory for the trade union technical school would be placed in service, as well as a warehouse for consumer and industrial goods and a laundry, dry cleaners and other facilities. And where are they? As a people's deputy of the Kuznetsovskiy village soviet, I have to listen to such a question rather frequently from my electorate. How am I to answer them?

This substantial gap in our work possibly appears to other economic planners as trifling as compared to other tasks which have been completed: for them, it is more important to place an industrial facility in operation, so as report to higher authorities on time. But our party poses the question in a different manner. Today, the construction of social, cultural and personal facilities should not lag behind industrial facilities. Such is the requirement of the 26th CPSU Congress.

The party manifests a fatherly concern for the vital needs of working people. And we? Why do we still take such poor care of ourselves? We are having hot debates at the expanded meetings of the permanent production conference, at workers' meetings and in the combined construction committee. Everywhere there are conversations about quality, about a strict and fundamental approach to the evaluation of work . . . it is as if everyone understands and when the actual business is encountered, the picture is different.

Not so long ago, the acceptance commission rated a number of personal service facilities with a "four". But as the technical inspectorate attests, these ratings were clearly overstated. In the refrigerator, let's say, instead of plaster, there was an interior coating, the finish work on the kindergarten room did not at all stand up to criticism: the impression was that there was not a single skilled workman there, nor a foreman, and everyone did what he felt like. The same can be said about the pharmacy, the milk kitchen and the external dosimetry station.

The members of the special commission apparently formally sign the protocol. If the technical inspectorate refuses to accept poor quality work, it immediately comes up against all kinds of pressure from the foreman and brigade leader who require a high rating for the work, since they did it on a job contract plus bonus basis. It once went so far that the foreman of section No. 1, B.P. Pashko made a show of tearing up the official documents since its rating of "satisfactory" did not suit him you see. There should be such energy for the battle for production standards and high quality construction! And was not clearly incomplete work covered up if only to gain the wages? Enough of actually regarding self-seeking in this way and substituting inflated indicators for the actual ones!

Some people pile the blame for their own blunders on anyone at all, if only to cover up their own lack of responsibility. Let us say that cast-iron pipes have been laid, and it soon it turns out that they have cracks. The sanitation engineers there and then allege that the pipes are plant rejects, although they delivered the pipes with dump trucks and dumped them helter-skelter on the ground. And thereafter: breakdowns in the main and again, searches, reworking, expenses . . . because of a careless attitude at the sites, even high quality materials are transformed into rubbish. Take a look, of just one unused batch of mortar, how much remains at the same social, cultural and personal services facilities! When it hardens - try to gouge it out . . .

I have already mentioned the attitude of some economic planners to nonindustrial facilities. None of them denies that this is a necessary matter. But nonetheless, they consider them secondary. Such an approach has had an impact on the creation of the material base and the selection of personnel for these sections. Over the past three years, three directors have been replaced - and all of them did not do their duty. The sections were not sufficiently equipped with either specialists or workers in the mass trades nor did they have economic independence. This also explains the lag to a considerable extent.

Such a situation is impermissible today. In order to set things right, in my opinion, an independent substructure must be created in the structure of the general contracting organization: the RAE construction administration (such as, let's say, at the Chernobyl'skaya nuclear power station), or an individual administration must be organized with its own cost accounting and clearly defined tasks. In any case, everything must be done right now in our interests to fulfill the state plan for residential and social and cultural construction.

I speak about this because I ache with all my heart for the successful completion of the construction of Rovenskaya AES. The atom works for man, for peace and for

our well-being. This means that the success of the undertaking depends on each of us, on our conscientiousness and responsibility.

The Department of Worker's Life

Placing the planned capacity on line is in prospect in the 11th Five-Year Plan at the Rovenskaya AES. This is written in the Basic Directions. The task is an important one. The builders are filled with resolve to carry it out in the best possible manner.

It is specifically about this that Ye.A. Shalash writes. We are confident that an attentive approach will be taken to her proposal in the administration and party committee of the construction project. In essence, we hope to obtain specific answers to the questions touched on here. In regular issues of the section "Think and Decide!", we will report to readers what has been done in practice.

8225
CSO: 1822/138

ELECTRIC POWER

ADVANTAGES OF THERMAL POWER STATIONS EXAMINED

Moscow SOVETSKAYA ROSSIYA in Russian 19 Mar 81 p 1

[Article by V. Popov, professor, doctor of economic sciences, chief of the Economic Forecasting Laboratory of the Institute of Economics and the Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences, Kemerovo: "A Letter with a Proposal. What Are the Advantages of Thermal Power Stations?"]

[Text] Siberia is by rights today considered a leading economic region.

It is difficult to enumerate the major riches of the region. But I would like to especially talk about one of them. All the more since Siberia is frequently called the nation's power engineering shop. More than half of the discovered reserves of oil, natural gas and hard coal are concentrated here. And all of this is constantly being drawn into the economic turnover. Thus, in the past five-year plan, Siberia provided more than 90 percent of the entire increase in organic fuel extraction.

Nonetheless, industrial enterprises in the eastern region are experiencing an energy hunger with increasing frequency and a shortfall of heat. The fuel reserves are in and of themselves only half of the matter. In order to provide for a stable rise in the productive forces of Siberia, and moreover, advanced development of such sectors as chemistry, ferrous and nonferrous metallurgy, as well as deep wood processing, capacities are needed in addition to produce electrical power and heat.

It would seem that everything should be in order for this. Who is not well aware that the most powerful electric power stations are being built today right in Siberia. But we will not jump to conclusions.

In its time, Siberian power engineering was developed using coal from the Kuznetsk, Irkutsk and other basins. The extraction of oil and gas from the Tyumen' open spaces did not cause any substantial changes, since the overwhelming portion of this raw material is transported to the Urals and to the European area. Only a small amount of gas is used for internal needs in the Tyumenskaya Oblast and the Kuzbass.

During the 1960's and 1970's, Siberian power engineering actually received considerable support from hydroelectric power stations. The largest GES's of the Angaro-Yenisey series went on line: the Bratskaya, Ust'-Ilimskaya, Krasnoyarskaya and Sayano-Shushenskaya. In the near future, the Boguchanskaya will be added to them and even later, the Sredne-Yeniseyskaya and a number of others.

Of course, hydroelectric power stations have a number of undisputed advantages. They use an annually renewed natural "fuel": the river discharges and do not pollute the atmosphere with industrial emissions. It is easy to control water powered turbines: they can be started and shut down in a short period of time, something which is quite important when loads change in the mains.

But it is impossible not to see substantial disadvantages. Here is one of the major ones: GES's over the course of a year produce markedly less electrical power than thermal power stations per kilowatt of installed capacity. The fault here is the lack of agreement among the interests of numerous organizations. During the summer, it is necessary to accumulate water behind the dam for the large winter loads, but it is just during this time that a deep channel is needed in the rivers for the river fleet, the timber industry (for timber floating) . . . and so it turns out that a GES with a capacity of six million kilowatts annually generates about the same amount of power as a GRES with a capacity of 3.5 million kilowatts. Thus, an excess of electricity in the summer and a sharp shortfall in the winter are especially characteristic of Siberia.

Many years of practice have shown that it is most efficient to combine the capacities of thermal power stations and GES's so that the latter amount to a relatively limited amount in the overall balance: approximately 30 to 35 percent. It is specifically this proportion, taking into account the reserve capacities at GRES's, that is capable of providing a normal electrical power supply.

But the problem is that in Siberia, primarily hydroelectric power stations have been built in the last five-year plans. The specific weight of their capacities today amounts to more than 50 percent. In this case, this indicator continues to grow. Moreover, bringing thermal power stations on line sharply lags behind the urgent demand.

The situation is made worse by the fact that even the now existing power capacities cannot be used normally. The main restraining factor is the poor carrying capacity of the major electrical power transmission trunk lines. In Siberia, speaking the language of power engineer, "locked up capacities" have appeared. The lack of a well thought out long term scheme for the development of the networks has had an impact there. And today, the construction of power transmission lines continues to lag, reducing the major advantage of the unified power system: the capability of operationally timely maneuvers.

So Siberia and its industry have been placed at a disadvantage. Specialists have for a long time warned against such a situation. Alas, timely conclusions were not drawn. Moreover, even now when the necessity of the accelerated element of thermal power stations in Siberia has become obvious, the USSR Ministry of Energy is not hurrying to take the requisite steps.

It is thought that it is essential in future plans to provide for the advanced development of the thermal electric power stations of Siberia, as well as to improve its unified power system.

8225
CSO: 1822/138

ELECTRIC POWER

USE OF WIND TO GENERATE POWER EXAMINED

Moscow PRAVDA in Russian 13 Apr 81 p 7

[Article by P. Bogdashkin, power engineer, Moscow: "Wind in the Sails of Power Engineering"]

[Text] Even soon after the end of the Great Patherland War, academician A.V. Vinter substantiated the expediency of the manufacture and use of several thousand wind motors with an overall capacity of 20 million kilowatts in the nation. For this, it was proposed that a specialized power machine building sector be created as well as a scientific center with a design office and an experimental plant. As a result, the Central Scientific Research Laboratory for Wind Power Engineering (TsNILV) was formed, where techniques were developed for automatically controlling a wind rotor and plans were developed for large wind electric power stations (VES's) and wind power generation systems. An experimental 12 unit wind electric power station with a capacity of 400 kilowatts was constructed and operated in Kazakhstan. However, without the supervisory organ for wind power engineering its "sails" were filled very poorly.

A considerable success was noted in 1975, when the "Tsiklon" scientific production association was set up in the system of the USSR Ministry of Land Reclamation and Water Resources. Its tasks included the planning, production and installation of wind electrical power plants for consumers. They were intended to provide electrical power to farms, field camps, etc. The manufacture of the "Tsiklon-6" machines with a capacity of four kilowatts has been started at the Astrakhan "Vetroenergomash" mechanical plant. The production of "Tsiklons" with capacities of 16, 30 and 100 kilowatts is planned.

As early as when this association was created, the USSR Ministry of Water Management and Ministry of the Electrical Equipment Industry determined the need of the nation for 150,000 such plants with an overall capacity of more than four million kilowatts. Unfortunately, the USSR Ministry of Water Management, on which the obligations of head organization in the development of small wind power engineering were placed and its All-Union Main Agricultural Water Supply Administration are poorly managing this association. The fifth general director in five years has already been replaced here. The ministry is not coping with the series production of the generators, since the ministry has not released the "Vetroenergomash" plant from the manufacture of products foreign to it.

And nonetheless, the small wind power plants are only a part of wind power engineering. The resolutions of the 26th Party Congress provide for an increase in the scales of the utilization of renewable energy resources in the national economy, including the wind. The issue, in my opinion, should be the design of higher power and more economical generators.

It is expedient to construct large wind electric power stations, combined into wind power systems, predominatly in the regions of the far north, areas near the sea and in mountain passes - there where constant strong wind currents are the rule. The electrical power generated by them can provide for no small portion of the demands of the populace and industrial production in remote regions. In the future, considerable energy flows can be routed into the power grids.

Because of this, attention has been drawn to an article published in PRAVDA on January 5th: "Is is necessary to spend money on the wind?" I feel that its authors, K. Vashkevich, P. Zhuravelev and Ya. Shefter treat the proposed task with a lack of perspective and assign wind power just a quite subsidiary role. The conversation concerned the construction of predominantly small wind power plants, the overall capacity of which in the immediate future, according to the calculations of the authors, can be brought up to 800,000 to 850,000 kilowatts.

We see by starting if only with the fact that for the cited total capacity, it will be necessary to manufacture hundreds of thousands of small generators, expending a large amount of metal on them. Considerably less metal goes into the fabrication of large wind electric power stations of the same overall capacity. The operational expenditures are reduced to an even greater extent. In general, small machines, as it seems to me, cannot be the leading trend in the development of wind power engineering.

Definite experience has already been acqured in the nation in the design (and partially also in the construction) of large wind power generating plants. As early as the 1930's, a wind electric power station with a capacity of 100 kilowatts was in service (in Balaklava). A project plan was designed for a wind electric power station with a capacity of 1,000 kilowatts (the war interfered with its construction). There now exist even more courageous project plans and concepts. Among them is an experimental eight rotor wind electric power station with a capacity of 1,000 kilowatts. A rotor with a capacity of 5,000 kilowatts and an eight rotor wind electric power station with a capacity of 40,000 kilowatts is in the design stage. The practical implementation of this engineering concept has been taken on by the USSR Ministry of Power Engineering and Electrification.

Considering the necessity for the accelerated creation of high capacity wind power engineering, it is expedient to force the design and construction of the first large wind electric power stations.

8225
CSO: 1822/138

FINN PRESS: FINNISH FIRMS TO SUPPLY MHD POWER PLANT PARTS

Helsinki HELSINGIN SANOMAT in Finnish 29 May 81 p 34

[Article: "Initial Results of Negotiations Already Available: Finnish Equipment for Soviet Major Power Plants"]

[Text] Two Finnish firms achieved favorable results Thursday at the Finnish-Soviet cooperative seminar which is dealing with the construction of major MHD power plants and the development of MHD technology.

As a result of this cooperative effort, the Finnish firms, Nokia Oy, Outokumpu Oy, Tampella Oy and Stromberg Oy, will probably have an opportunity to supply equipment for the major MHD power plant to be built in the Soviet Union. The negotiations will go on until Tuesday.

Academician A.E. Sheindlin, who heads the group of Soviet experts at the seminar, did not disclose which two firms were decided on in the negotiations.

Tampella and Nokia will probably be involved in the longest negotiations on equipment shipments. Nokia is to continue its former technical cooperation with the Soviets on the MHD project. Tampella has been carrying on bilateral negotiations all winter long.

Working together, Nokia and Stromberg will concentrate on electrotechnical equipment, Outokumpu on the application of superconductor cables and copper and Tampella on the delivery of the boiler equipment to the MHD power plant.

The world's first major MHD power plant will be completed by 1985 in the city of Ryazan', located 175 km from Moscow. Construction costs for the 500-Mw electric power plant will come to about 860 million marks.

MHD Technique Saves Energy

In an MHD generator, that is, a magnetohydrodynamic generator, heat energy is changed directly into electrical energy while flowing through a magnetic field at a high temperature.

According to Sheindlin, the new MHD technology is superior to any other thus far developed.

Even the first major MHD plant will save 22 percent in fuel by comparison with an ordinary steam-powered plant. The MHD technique is also favorable to the environment. Discharges of heat pollution and noxious materials will be much smaller than they have been in power plants to date.

Academician A.E. Sheindlin stressed the fact that the MHD technology has a broad range of application regardless of the source of energy. Because of this, extensive development and research projects are being engaged in in the Soviet Union.

"It is important for Tampere, in Finland, to have experts and scientists who are specialized in this field," academician Sheindlin emphasized. In this field he made particular mention of Prof Osmo Hassi, who is the director of the Tampere Institute of Technology.

The Tampere Institute of Technology, which has been engaged in MHD research projects since 1976, has established a basis for this cooperative seminar which is to continue until next Tuesday.

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BRIEFS

DAGESTAN WIND POWER GENERATION--Makhachkala. The laboratory of the Dagestan division of the Caspian Scientific Research Institute for Fisheries Management have been changed over to a new kind of energy: an independent "Tsiklon" wind electric power station has started operation on the territory of the scientific settlement. "The possibilities for economically advantageous utilization of wind energy under Dagestan conditions are great," says the Gosplan chairman of the republic, candidate of the engineering sciences A. Gadzhiyev. "It has been established that in the territory of the kray, the average annual wind velocity exceeds six meters per second, and the main thing, we have very few calm periods (about 20 percent of the overall annual time). The use of the potential energy of the wind even in a range of 10 percent can provide us with about six billion kilowatt hours of electrical power. Gigantic possibilities, especially if you consider that in Dagestan, the demand for thermal power is as yet not fully satisfied. This is why as early as last year we concluded an agreement with the "Tsiklon" association for the joint conduct of scientific and engineering research on the utilization of wind power in the economy of the republic, figured to run right up to 1990. The senior scientific associate of the Dagestan affiliate of the Power Engineering Institute imeni G.M. Krzhizhanovskiy, candidate of the engineering sciences M. Akhmedov pushes a button. With a rustling sound cutting through the air, the metal six-meter blades of the installation begin to turn. After a minute they change into a solid circle flashing in the sun. Electrical power flows through a cable into the laboratories. This is the first electric wind power station in the mountainous region. But "Tsiklons" will go into service in winter pastures, and provide power to the high mountain villages. [by A. Kazikhanov] [Text] [Moscow IZVESTIYA in Russian 18 Feb 81 p 6] 8225

POWER LINE SPANS LENA--Yakutsk, 20 March. The construction of an electrical power transmission line more than six kilometers long across the Lena River has been completed. It was not easy to construct the power bridge across the great

Siberian River. The height of some of the support poles reaches 140 meters while the length of the spans between them runs to 1.7 kilometers. Thousands of cubic meters of concrete were poured in the support foundations and tens of piles were driven. In the course of the work, the leading brigades of the "Gidromontazh" trust and the "Vilyuygesstroy" administration overfulfilled the norms by a factor of two. The placing of the permanent electric power transmission line in service, which connects the shores of the Lena, makes it possible to shut a number of uneconomical diesel electric power stations and to boost the reliability of the power supply for enterprises and population centers in the Alekseyevskiy, Amginskiy, Megino-Kangalasskiy, Ust'-Aldanskiy and Churapchinskiy regions of the Yakutskaya ASSR. As a result, it will be possible to save about four million rubles annually. [by V. Yermolayev] [Text] [Moscow PRAVDA in Russian 21 Mar 81 p 1] 8225

CENTRAL ASIAN POWER LINE--The construction of the longest 500 kilovolt power line in Central Asia is completed. Voltage has been applied to the largest high voltage electrical power transmission line in the integrated power system of the republics of Central Asia and Southern Kazakhstan, which runs 368 kilometers from the Maryyskaya GRES to Karakul'. The gigantic energy bridge across the Amudarya and the Kyzylkum, which ties together the fraternal republics of Turkmenia and Uzbekistan, has gone into service. The collectives of electrical network builders of the Sredazelektroset'stroy" and "Spetsset'stroy" trusts of the USSR Ministry of Power Engineering and Electrification completed the construction of the longest 500 kilovolt power line in Central Asia in record time; the excess power of the Maryyskaya GRES will be transmitted to the Bukhara region of the Uzbekistan power system via this line. With the placing of this important line in service, a reliable link has been established between the power systems of the neighbor republics. The indicators of this trunk line are impressive; it is designed for the transmission of one million kilowatts of electrical power. The estimated cost of construction of the line amounted to 27 million rubles. According to the project plan, it was necessary to use more than 11,600 tons of rolled metal, 15,600 cubic meters of prefabricated reinforced concrete and 5,400 tons of wire in its construction. The efficiency experts of the "Sredazelektroset'stroy" and "Spetsset'stroy" worked out a number of proposals which were directed towards reducing the cost and curtailing the time for the construction of the line. The introduction of intermediate supports with increased overall dimensions made it possible to reduce the number of them by 200 and save 1,700 tons of rolled metal in this case. The use of a specially designed strengthened wire for crossing the Amudarya made it possible to reduce the height of the intermediate supports and save 400 tons of structural materials in this case. In all, the efficiency experts of the trust saved more than 3,000 tons of rolled metal in the construction, while its construction cost was reduced by more than 2.5 million rubles. Work on the construction of the line was not stopped either in the severe winter cold or in the summer heat. The brigades of electrical power lineman of mechanized columns Nos. 48 and 71 were models of labor heroism and honorably fulfilled their obligation, completing the construction of the line by the 26th Party Congress. [by N. Rudenko, chief engineer of the "Sredazelektroset'stroy" trust] [Text] [Tashkent PRAVDA VOSTOKA in Russian 14 Mar 81 p 3] 8225

POWER LINE ACROSS VOLGA--Kostroma A bundle of metal filaments, which are supported on both shores of the river on 130 meter towers, has formed a gigantic "arc" over the Volga. This is the power bridge of two high voltage lines under construction. It was initially proposed that individual crossings of the Volga be constructed for each electrical power transmission line. But a creative group of Kostroma and Moscow engineers developed an original plan for a combined two circuit power bridge. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 9 Apr 81 p 1] 8225

SYRDAR'INSKAYA GRES--The assembly of the boiler has been completed in the construction of the 10th and last power unit of the Syrdar'inskaya GRES. Work is going on around the clock at the site, each shift prepares the work for the next one and there is no standing idle here: a stringent starting schedule is strictly observed. Welders, insulation workers and hydroelectric engineers have come from all parts of the nation to assist the Uzbek builders. Installation organizations of the Urals and the Caucasus, the Povolzh'ye and Siberia have sent their own representatives. The Syrdar'inskaya GRES has already generated about 60 billion kilowatt-hours of electrical power, fed into the Central Asian ring. Soon a new influx will flow into this electrical river. Start up the tenth! [Text] [Moscow KRASNAYA ZVEZDA in Russian 17 Feb 81 p 1] 8225

KUZBASS-URALS POWER LINE--The northern oil and gas extraction regions of the Tomskaya Oblast have gained a reliable power supply. The 220 volt power transmission line joining the power systems of the Kuzbass and Urals into a single ring has been placed under industrial load. The last 116 kilometer section of the Chapayevka--Sosnino line was built with particular difficulty. The unfrozen swamps and the taiga interfered with the movement of equipment. The equipment was delivered by helicopters. The installation workers erected supports 156 meters high on both shores of the Ob' in making the crossing of the river. Their rich experience aided the Siberians in handling the asignment within the deadline. More than 10,000 kilometers of high voltage electrical power transmission lines have been built above the Vasyugan swamps over the last two five-years plans. This will make it possible to more rapidly master the underground storerooms. [Text] [Moscow KRASNAYA ZVEZDA in Russian 3 Apr 81 p 1] 8225

TURKMENIA-UZBEKISTAN POWER LINE--Having marched 368 kilometers through the desert, the 500 KV power line has gone into service which links Turkmenia and Uzbekistan with a new power bridge. The high voltage electrical power transmission line started at the Maryyskaya GRES and finished in the Bukhara region. It was strung in a record short time by the collectives of the mechanized columns of the "Sredazelektroset'stroy" and "Spetsset'setroy" trust of the USSR Ministry of Power. Through the worker's know-how and the initiative of the efficiency experts of the two trusts, more than 3,000 tons of rolled metal was saved, and the entire construction project cost the state more than 2.5 million rubles less than the plan. In a word, the slogan "save everywhere and in everything, efficiently utilize reserves and show creative energy", proclaimed by Leonid Il'ich Brezhnev at the 26th CPSU Congress was brillinatly confirmed in the construction of the electrical power bridge. The power from the Maryyskaya GRES will provide for the needs of the economy of the western portion of the Bukhara oasis and the northwest Kashkadar'inskaya Olbast, where new

land is being put in production, irrigation structures and chemical enterprises are being built, gas pipelines and roads are being layed and new cities are growing up. [by Sh. Zaynutdinov] [Text] [Moscow IZVESTIYA in Russian 28 Mar 81 p 1] 8225

MOLDAVIAN WIND POWER GENERATION--Kishinev. Wind power has strated to be used to feed artesian water to small irragation systems remote from electrical power transmission lines in Moldavia. The operationally and inexpensive supply of moisture to the fields and vineyards have been assigned to plants using wind generators. The electric power station for the needs of small-scale irrigation was designed at Kishinev Polytechnical Institute. The new unit has already been tested in five kolhozes and sovkhozes. Wind power plants generate electrical current here, by means of which the water is delivered to the summer pastures. A widescale program has been developed for the utilization of wind power in the Moldavian economy. To implement the program, pumping equipment is needed which has been designed taking into account the specific natural features of Moldavia and the particulars of specific operations. The reorganization of the higher educational institute laboratory in the Moldavian affiliate of the "Tsiklon" scientific-production association will make it possible to solve this and other problems of applied wind power engineering. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 9 Apr 81 p 1] 8225

NEW POWER LINE--Neryungri. The ancient Evensk village of Iyengra, located not far from the Bam-Tynda-Berkakit railroad line, has received a reliable source of electrical power. The apartment houses, public buildings and commercial facilities have now been connected to an electrical power transmission line from the Zeyskaya GES. This gift to the rural workers was made by their chiefs: the builders of the Yuzhno-Yakutsk coal complex and the Neryungrinskaya GRES. [by L. Rybakovskiy] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Mar 81 p 2] 8225

MAYNSKAYA GES CONSTRUCTION--Sayanogorsk. The hydroelectric builders have started the construction of an important facility at the Maynskaya GES, the building where the control console and other services will be housed. The capacity of the Maynskaya GES, which is located a few kilometers down stream from the Sayano-Shushenskaya on the Yenisey, is 340,000 kilowatts in all. But this "little one" is quite important. During the operation of the Sayano-Shushenskaya GES, the water level in Yenisey will fluctuate sharply, something which is dangerous for the passage of ships and the normal spawning of fish. The new GES will maintain a stable river level. [by V. Vasil'yev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Mar 81 p 2] 8225

CENTRAL ASIAN POWER LINE--A power bridge across the desert. The integrated power system of the republics of Central Asia and southern Kazakhstan has been supplemented with yet another, the very largest power transmission line. The gigantic power bridge which is 368 kilometers long has crossed the Amudar'ya, spanned the sands of the Karakum and coupled the Maryyskaya GRES in Turkmenia to Karakul, which is in the south of Uzbekistan. The 500 kilovolt power line

was constructed by the "Sredazelektroset'stroy" and "Spetsset'stroy" trusts of the USSR Ministry of Power Engineering and Electrification in record time. Effeciency experts and inventors played an important part in this. Because of their proposals, more than 2.5 million rubles were saved in the construction of the line. [Text] [Moscow PRAVDA in Russian 16 Mar 81 p 2] 8225

TURBINE CONSTRUCTION SHOP--Khar'kov. For nulcear power engineering. Khar'kov turbine builders have given operational acceptance to the first stage of the new mechanical machining and welding production operation. The complex of shops with an area of 34,000 square meters is intended for the fabrication of welded structures and large frame assemblies. With the expansion of the enterprise, the output of steam turbines for nuclear power engineering with capacities of 220,000, 500,000, 750,000 and 1 million kilowatts will be significantly increased. In the future is the design of even more powerful equipment. [by A. Vyatkin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Mar 81 p 2] 8225

KOLYMSKAYA GES--Sinegor'ye, Magadanskaya Oblast'. A work holiday arrived on February 22nd in Sinegor'ye, a settlement of hydroelectric builders: the first unit of the Kolymskaya GES was generating power. The all-union key Komsomol construction project had waited more than 10 years for this day. Here, where the spurs of the Chersk mountain range compress the current of the stormy and willful Kolyma with granite rocks, a motor vehicle landing party disembarked. The first builders arrived here from the Vilyuyskaya GES, having driven 3,500 kilometers over winter roads. The chronicle of the construction of the hydroelectric power station on the permafrost is a chronicle of triumph. Numerous engineering design solutions for this construction project have no analogs in applied domestic and foreign hydroelectric power construction. About a thousand of the nation's enterprises are suppliers to the Kolymskaya GES. According to the project plan, the height of the dam should reach 126 meters. The turbine room of the station, where five generator sets are housed, was cut out of the rock. Placing the Kolymskaya GES on line is a qualitative renewal of the entire power system of the far northeast of the nation. "Bringing the station up to the design capacity," said the first secretary of the Magadanskaya CPSU Oblast Committee, N. Mal'kov, "will open broad prospects for a fundamental and accelerated transformation of the industrial and social and cultural appearance of the vast regions of the oblast. Mining enterprises, reindeer husbandry sovkhozes, sea ports, as well as the cities and settlements of the Kolyma and Chukotka are waiting for the power of the Kolymskaya GES. The "Start!" command sounds. The Kolymskaya GES has started to operate in the five-year plan! [by V. Kursov] [Text] [Moscow IZVESTIYA in Russian 23 Feb 81 p 6] 8225

KURPSAYSKAYA GES--Karakul', Kirghiz SSR. The first generator unit at the Kurpsayskaya GES has taken on a working load - yet another hydroelectric power station in the Naryn series. Never has domestic hydroelectric construction known such a pace. From the first landing of the builders at the section line on the river to the first kilowatt-hour of electrical power, the total distance amounts to four years. The builders of the Kurpsayskaya GES have run an entire year ahead of the planned deadlines. "The curtailment of the deadlines has been

achieved, in particular, through a stage by stage construction method," says the project planner, Yu. Korneyev, "For not only the invaluable experience in the construction of the Toktogul'skaya GES, but also its industrial base were used in the Kurpsayskaya." We will also add that the worker competition joined the collectives of numerous manufacturing plants together in a single endeavor: "You will deliver the first unit of the Kurpsayskaya GES a year ahead of schedule, on the day of the opening of the 26th CPSU Congress!" At the Kurpsayskaya, the installation workers of the specialized "Spetsgidroenergomontazh" section, which is headed by S. Osherovskiy, are called the true heroes of the start. In the immediate future, the second, third and fourth units will be installed. They will begin work on the construction of the Tash-Kumyrskaya GES on the river. [by B. Prokhorov] [Text] [Moscow IZVESTIYA in Russian 23 Feb 81 p 6] 8225

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June 26, 1981